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दंत चिकित्सा – दंत घूर्णी उपकरण – परीक्षण पद्धतियाँ

Indian Standard

DENTISTRY — DENTAL ROTARY INSTRUMENTS — TEST METHODS

UDC 616·314 : 681·3·04

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

June 1993

Price Group 3

Dentistry Sectional Committee, MHD 8

NATIONAL FOREWORD

This Indian Standard which is identical with ISO 8325 : 1985 'Dentistry — Dental rotary instruments — Test methods', issued by the International Organization for Standardization (ISO), was adopted by the Bureau of Indian Standards on the recommendation of the Dentistry Sectional Committee and approval of the Medical Equipment and Hospital Planning Division Council.

The text of the above mentioned ISO standard has been approved as suitable for publication as Indian Standard without deviations. Certain terminology and conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.

b) Comma (,) has been used as a decimal marker while in Indian Standards, the practice is to use a point (.) as a decimal marker.

In this Indian Standard the following International Standards are referred to. Read in their respective place the following:

International Standard	*Indian Standard*	*Degree of Correspondence*
ISO 1101 Technical drawings — Geometrical tolerancing — Tolerancing of form, orientation, location and run-out — Generalities, definitions, symbols, indications on drawings	IS 8000 (Part 1) : 1985 Geometrical tolerances on technical drawings : Part 1 Tolerances of form, orientation, location and run-out and appropriate geometrical definitions (*first revision*)	Identical
ISO 1797 Dental rotary instruments — Shanks	IS 6462 : 1972 Fitting dimensions for dental burs and cutters	Technically equivalent
ISO 2859 Sampling procedures and tables for inspection by attributes	IS 2500 (Part 1) : 1973 Sampling inspection tables : Part 1 Inspection by attributes and by count of defects (*first revision*)	Technically equivalent

ISO 3630 'Dental root canal instruments' appearing in the normative reference of this standard does not have the corresponding Indian Standard. The Dentistry Sectional Committee has, therefore, decided that it is acceptable for use in conjunction with this standard.

For the purpose of deciding, whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in the standard.

Indian Standard

DENTISTRY — DENTAL ROTARY INSTRUMENTS — TEST METHODS

1 Scope and field of application

This International Standard specifies methods of test for dental rotary instruments such as burs, cutters, diamond instruments and abrasives but excludes root canal instruments. In the relevant product standards reference is made to the methods specified in this International Standard.

For the testing of root canal instruments, see ISO 3630.

2 References

ISO 1101, *Technical drawings — Geometrical tolerancing — Tolerancing of form, orientation, location and run-out — Generalities, definitions, symbols, indications on drawings.*

ISO 1797, *Dental rotary instruments — Shanks.*

ISO 2859, *Sampling procedures and tables for inspection by attributes.*

ISO 3630, *Dental root canal instruments.*

3 Test methods

3.1 Diameter of working part

3.1.1 Apparatus

One of the following devices or other instruments of equivalent accuracy shall be used to determine the diameter of the working part :

a) **tungsten carbide ring gauges** which are regularly checked with mating plugs;

b) **dial indicator** with flat tungsten carbide blades;

c) **air gauge;**

d) **dial indicator bore gauge.**

The measuring device shall be accurate to 0,01 mm.

Mechanical measuring devices shall have a measuring force of $<$ 1,5 N.

In case of dispute, the reference method shall be the tungsten carbide ring gauge.

3.1.2 Measurement point

On cylindrical instruments, the measurement point shall be the middle of the working part, unless otherwise specified.

3.1.3 Procedure

For burs, cutters and abrasives, make one measurement at the largest diameter of the working part of the instrument. See figures 1 and 2.

For diamond instruments, make three measurements at angles of 120° at the relevant diameter as shown in figure 3. Release the force, lift the test piece and rotate it before each measurement. Use the same force for each measurement.

Record the average of the three values.

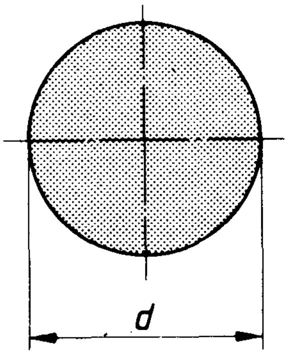


Figure 1 — Measurement of abrasives

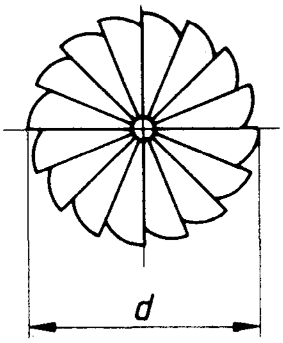
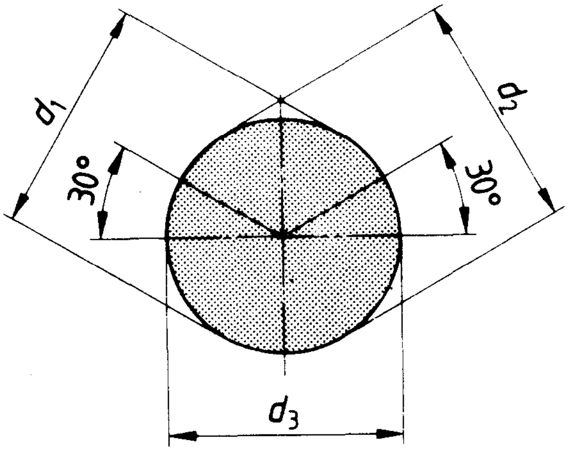


Figure 2 — Measurement of burs and cutters



$$d = \frac{d_1 + d_2 + d_3}{3}$$

Figure 3 — Measurement of diamond instruments

3.2 Neck diameter

3.2.1 Apparatus

Dial indicator, with knife-edged tungsten carbide blades of 0,3 ± 0,02 mm thickness, or **other devices of equivalent accuracy.**

The measuring device shall be accurate to 0,01 mm.

Mechanical measuring devices shall have a measuring force of $<$ 1,5 N.

3.2.2 Measurement point

The measurement point shall be the smallest diameter behind the working part. This also applies to diamond instruments with coated necks.

3.2.3 Procedure

Make one measurement of the neck of the instrument.

3.3 Length of working part

3.3.1 Apparatus

One of the following devices or other instruments of equivalent accuracy shall be used to determine the length of the working part :

a) **toolmaker's microscope;**

b) **calibrated blade-type micrometer;**

c) **gauge;**

d) **shadowgraph.**

The measuring device shall be accurate to 0,1 mm.

3.3.2 Measurement points

The measurement points shall be the points at the ends of the shortest length of the working part, including, where applicable, the coated neck.

3.3.3 Procedure

Make one measurement of the length of the working part.

3.4 Overall length

3.4.1 Apparatus

The apparatus listed in 3.3.1 is suitable.

3.4.2 Measurement points

The measurement points shall be the points at the ends of overall length, including tip and shank end.

3.4.3 Procedure

Make one measurement of the overall length.

3.5 Taper

Determine the angle of the tapers by making one measurement using a shadowgraph, a toolmaker's microscope or a comparator accurate to 1′.

3.6 Run-out

3.6.1 Apparatus

One of the following devices shall be used to determine the total indicated run-out, t:

3.6.1.1 Holding device

a) split V-block with adjustable distances l_1 and l_2, see figures 4a) and b);

b) equivalent device, for example precision chuck.

3.6.1.2 Measuring device

Dial indicator, dial gauge, comparator, toolmaker's microscope, shadowgraph or equivalent measuring device.

The measuring devices shall be accurate to 0,01 mm.

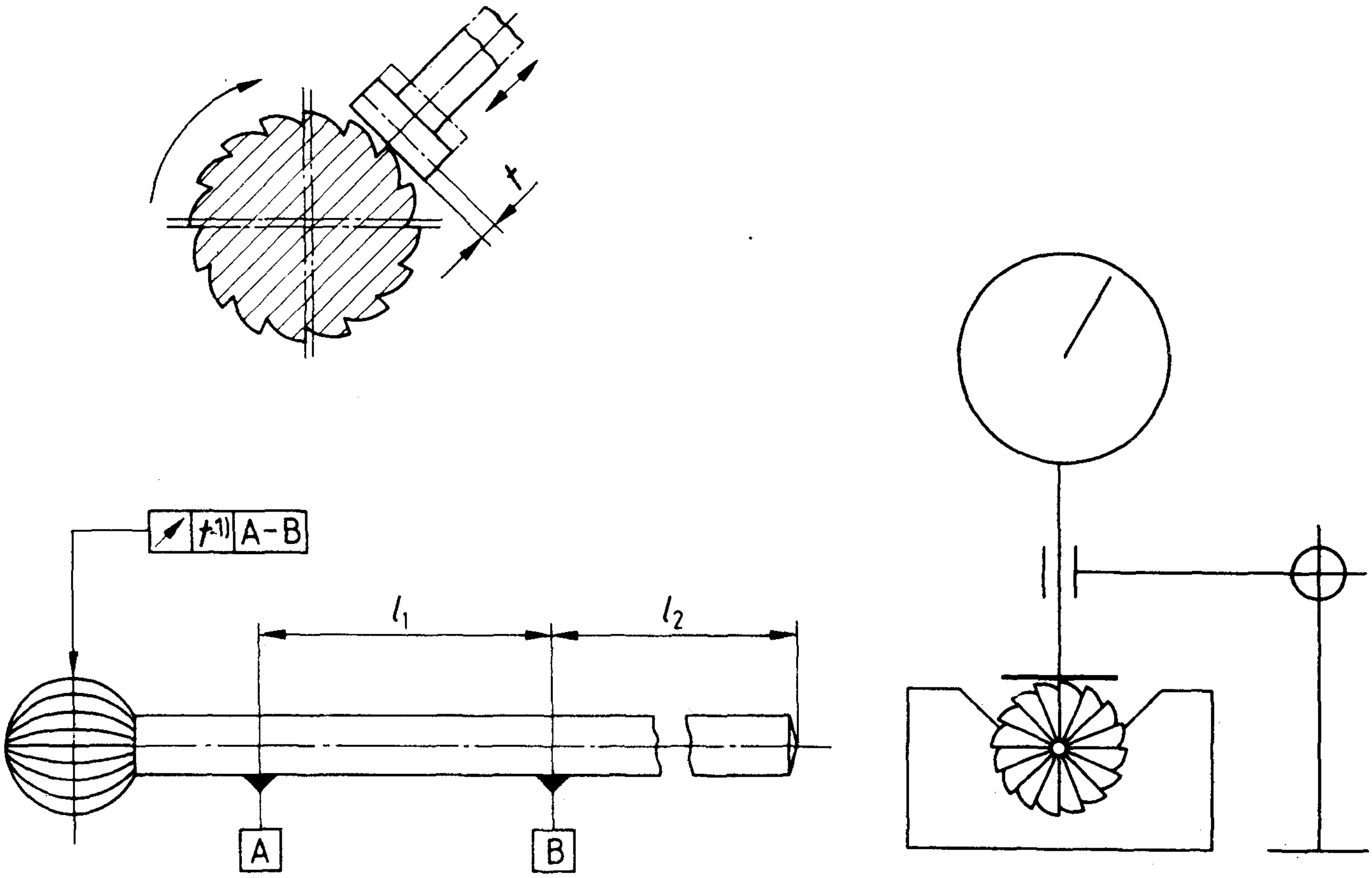
The lengths l_1 and l_2, which are dependent on the shafts and the lengths of the instrument tested, shall be in accordance with the table.

Table — Dimensions l_1 and l_2

Dimensions in millimetres

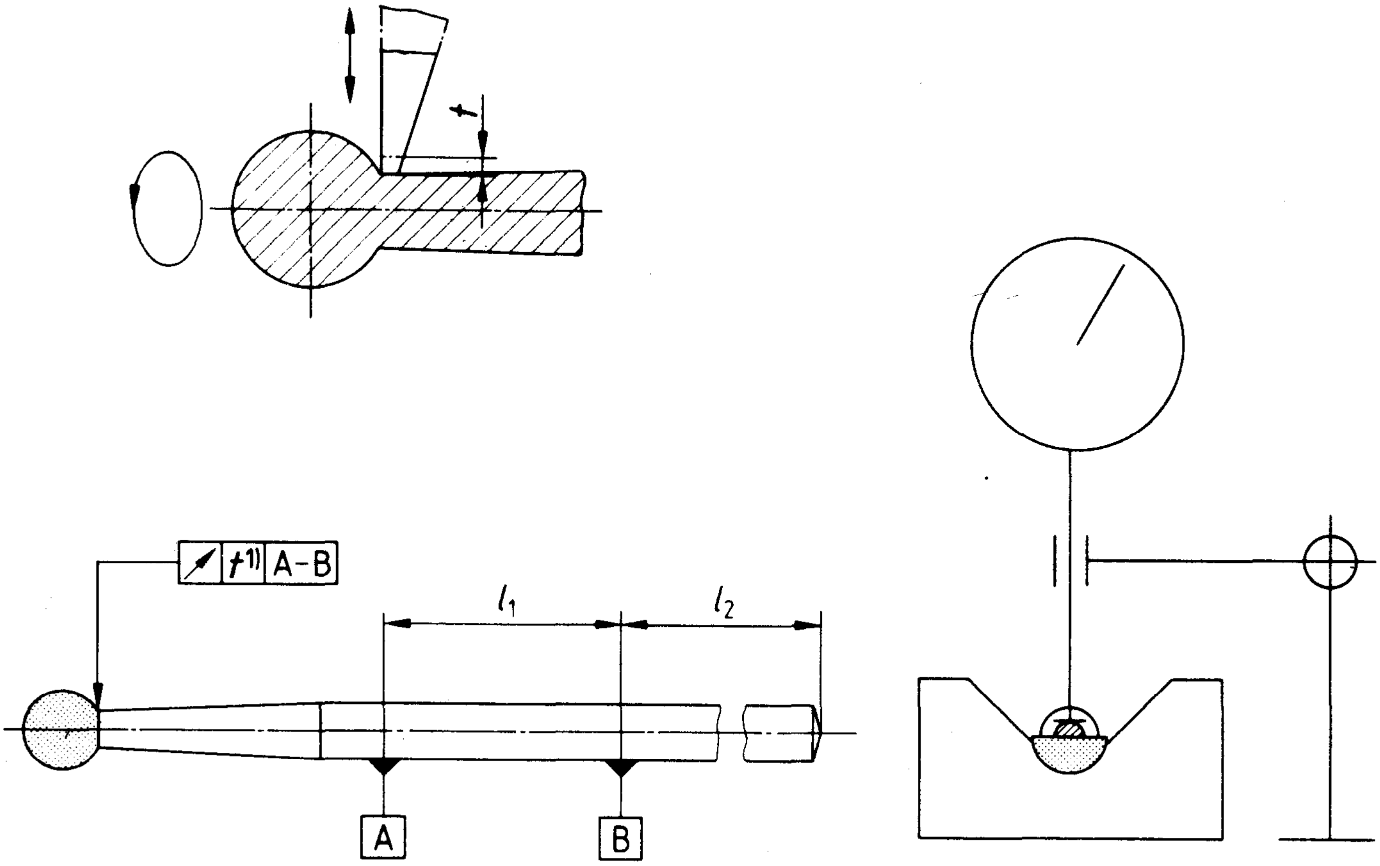
Type of shaft (in accordance with ISO 1797)	Overall lengths of instrument*	l_1	l_2
1	All lengths	10	3
2	All lengths	9	20
3	16,5 to 18,5	8	1
3	19 to 30	10	1

* See the relevant product standard.



1) For the value of the run-out tolerance, refer to the relevant product standard. See also ISO 1101.

Figure 4a) — V-block measuring device (measuring the total indicated run-out, *t*, at the largest diameter of the working part)



1) For the value of the run-out tolerance, refer to the relevant product standard. See also ISO 1101.

Figure 4b) — V-block measuring device (measuring the total indicated run-out, *t*, at neck diameter)

3.6.2 Measurement point

The measurement point for the run-out is dependent on the shape of the instrument and is given in the relevant product standard. It may lie at the largest diameter of the instrument [see figure 4a)] or just behind the working part of the instrument [see figure 4b)].

3.6.3 Procedure

Place the instrument in the holding device (3.6.1.1) and turn it slowly through 360°. Record the lowest and the highest readings. Calculate the difference and record as the total indicated run-out, *t* (see figure 4).

3.7 Neck strength

3.7.1 Apparatus

Apparatus which permits a load to be applied to the free end of the test piece with its long axis held in a chuck at an angle of the 22,5° to the horizontal. The chuck should enable test pieces of different lengths to be inserted to a depth as described in 3.7.3.

3.7.2 Test loads

The loads to be applied, which depend on the shape of the instrument, shall be those given in the relevant product standard.

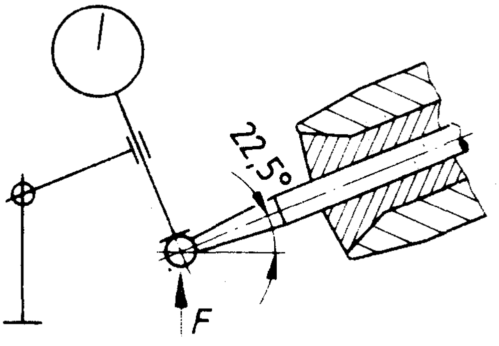


Figure 5 — Test piece at 22,5° to horizontal

3.7.3 Procedure

Place the test piece in the chuck (3.7.1) so that it is gripped up to the junction of the neck and shank.

Rotate the test piece and measure the run-out.

With the test piece held in a position such that the load will deflect the head in the direction of the maximum run-out, apply the load, specified in the relevant product standard and calculated from the following equation, to the tip of the head.

$$F = \frac{98 \times d_2^3}{d_1 + d_2 + l}$$

where

F is the test load, expressed as a force, in newtons;

d_1 is the nominal head diameter, in millimetres;

d_2 is the nominal neck diameter, in millimetres;

l is the minimum head length, in millimetres.

NOTE — This equation is used purely to obtain the numerical value of F. It is not balanced with regard to units.

Apply the load F for a period of 5 s. If no fracture occurs, remeasure the run-out.

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